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USER NEEDS SURVEY: PRELIMINARY RESULTS

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WP 1096-79 December 1979

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Introduction

We have undertaken an in-depth survey of managerial information needs and the DP practices and application systems intended to fulfill those needs. The objective is to improve our understanding of managerial end-users of computer systems -- what types of systems do they have and how satisfied are they with them; what types of systems do they want and what is inhibiting their development; how do they perceive their DP departments and why; what are their priorities and how is DP performing; etc. We are also investigating these issues from the point of view of DP management to identify areas of agreement and mis-perception.

The approach has been to directly survey user and DP managers on needs, procedures, policies, priorities and performance. This is not unlike a traditional marketing study, where a company surveys its customers and potential customers to determine their needs in order to affect product design, product mix, manufacturing procedures and corporate planning. Without a reliable needs definition for end-users, it is conceivable that DP departmental and systems plans will simply bypass users' true needs.

In the first phase of this study we have identified the relevant factors; developed an explanatory model of factor interaction; prepared an extensive questionnaire; and gathered data from 114 DP and user managers in six companies. The results from the initial data analysis are presented in this paper. Subsequent papers will report on additional data already gathered but not yet analyzed, on more detailed analysis of this data, a revised model and measurement

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techniques, and the results from additional data to be gathered in a larger survey of users. Our goal is to build upon a better understanding of managerial end-users to develop practical recommendations for DP and user management which facilitate needs recognition and fulfillment.

Purpose

The purpose of the User Needs Survey is to recommend enhancements in DP and user management practices for:

* implementing higher quality systems
* fulfilling recognized user needs
* expanding user perceptions of needed systems
* improving basic user attitudes toward DP
* improving DP responsiveness to users' needs

We are primarily interested in managerially actionable factors and explanations in this critical area of research. Our purpose is not merely to classify and characterize symptoms; rather to understand causes and the impacts of alternative practices on outcomes. Towards this end, this phase of the study has six preliminary objectives:

1. to classify and evaluate existing systems
   by * type of system
   * quality and importance
   * development process
2. to classify recognized but unfulfilled user information needs
   by * type of system
   * number of systems required
3. to identify constraints on user perception of needed systems
   by * causes (eg. awareness, attitudes, experiences, etc.)
   * type of system

4. to characterize and explain the basic responses of users to DP

   by * pro-active or resistant behavior

   * going outside the firm for DP services

   * failure to recognize where DP systems are needed

   * pressure to centralize or decentralize

5. to measure the quality and effectiveness of existing policies and procedures

   by * priorities of DP and user managers

   * success on relevant dimensions

6. to develop and validate a model which explains the interactions of the previous factors and allows management to better respond to specific DP and user problem environments.

Methodology

In order to study this complex process of user needs recognition and fulfillment we have developed a preliminary model of the process, a comprehensive questionnaire, and a special procedure for administering this questionnaire.

Figure 1 presents the research model used in this survey. Each box and arrow is composed of a cluster of factors (this is a standard method for reducing the number of interactions to a comprehendable number). The basic model is conceptually straightforward. A user's past experiences with DP affects his ability to perceive opportunities for systems-based help and his attitudes toward the DP department. User needs-recognition is the result of experience-based perception and DP support for informal pre-proposal investigation and actual proposal preparation. DP policies and procedures provide the services

which determine a user's system experiences and support for needs recognition and fulfillment of needs. This type of circular analysis can be pursued for any end-user to understand his/her current situation and devise a plan for change, if appropriate. In addition, the situations of many users can be aggregated to understand departmental or corporate responses to DP on a macro basis.

This research model was used to prioritize the thousands of factors and interesting questions which could have been asked in the survey. The resulting questionnaire has 314 items in total, although not all questions are answered by every respondent. There are five seperate sections of the questionnaire so that each manager receives only questions directly relevant to his or her organizational position. Each questionnaire was personally administered to each respondent to ensure a near perfect response rate and the integrity of the stratified sample. Consequently, the maximum time necessary to complete a questionnaire is one hour. Appendix 1 contains a sample section of the questionnaire.

Six companies were selected to participate in the first phase of this survey. In each company three departments were selected--DP, Finance, and Manufacturing.* Within each department a stratified sample of senior, middle, and junior managers was asked to respond to the questionnaire. Respondents were selected by name after interviews

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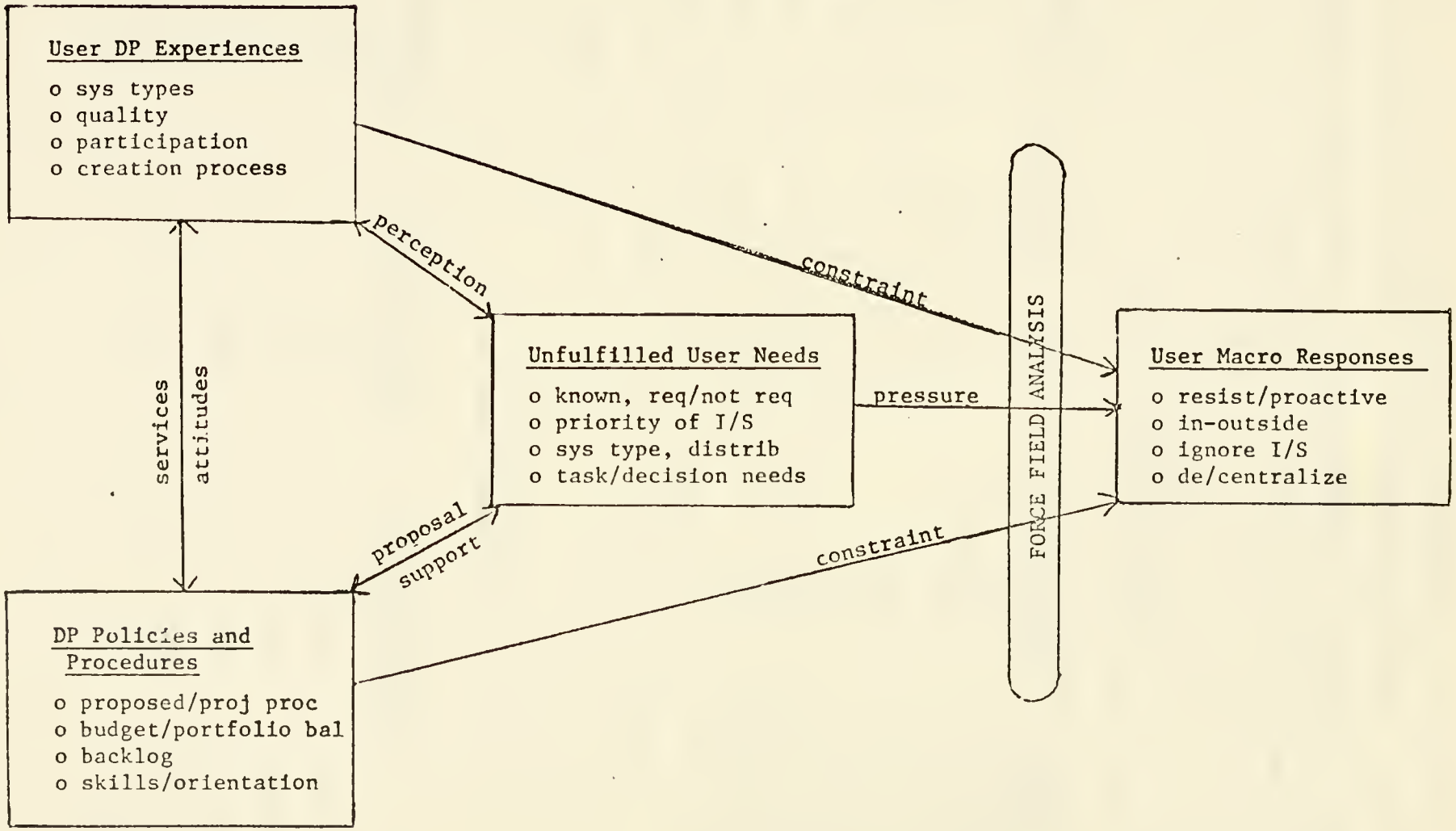
* Note that in most companies the Finance/Accounting functions were the first to be computerized and manufacturing is now a rapidly growing application area. This provides a good contrast between "old" and "new" user departments.

Figure 1
Research Model for User Needs Survey



with top management to identify incumbents of specific roles within each department. Respondent anonymity and company confidentiality are, of course, maintained. Figures 2 and 3 display some information about the six companies and the sample respondents.

Figure 2
The Six Company Sample

Company	Industry	Annual Sales	DP Budget	% DP/Sales	Number of Respondents
1	Manufacture	110m	2.2m	2%	11
2	Electronics	50m	1.0m	2%	34
3	Manufacture	240m	2.4m	1%	16
4	Chemical	65m	0.5m	0.8%	16
5	Electronics	700m	5.5m	0.8%	12
6	Electronics	67m	0.36m	0.53%	25
					114

Figure 3
Respondents Sample

Department	Questionnaires administered	Questionnaires completed	Response rate
Finance	37	33	89%
Manufacturing	53	48	91%
Total Users	90	81	90%
DP	34	33	97%
Total Sample	124	114	92%

Preliminary Results

There is a great deal of information in the database, only portions of which have been analyzed to date. The preliminary results presented herein are primarily status variables, observations of current situations or facts, not the causal relationships behind them. Subsequent analysis of additional status variables and their interrelationships per the research model should demonstrate causal relationships and, by implication, recommendations for change. We caution the reader about prematurely assigning causes to these facts before our analysis is complete.

The reliability of the data gathered by the questionnaire is excellent. We have (1) interviewed respondents before and after completing the questionnaire to corroberate their responses, (2) provided the opportunity for all respondents to ask clarifying questions, and (3), checked the distributions of reponses to individual questions to assure item discrimination and well-behaved distributions. Further, the respondents have been universally cooperative, considering the purpose important and taking the questionnaire seriously. We are especially pleased with the sophisticated discrimination of the user managers; where they have negative opinions of one aspect of DP, they have not allowed that to cast a shadow over other aspects where their DP department is doing comparatively well. Moreover, where DP is performing comparatively well but there is room for improvement, user managers have not overrated that aspect.

System Types

There has been a lot of discussion contrasting transaction processing applications with newer types of systems such as on-line inquiry and decision support systems. Using the classification of system types in Figure 4 we gathered data on installed and desired systems.

Figure 4

Definitions of Systems Types

Short Name	Description of DP Systems Types
monitor	the system monitors daily detail activity producing standard reports on a fixed schedule (daily, weekly, or monthly)
exception	the system processes daily detail activity but produces exception reports where the definition of exception conditions is fixed
inquiry	the system provides a database with flexible inquiry capability enabling managers to design and change their own monitoring and exception reports
analysis	the system provides powerful data analysis capabilities (modeling, simulation, optimization, or statistical routines) and the appropriate database to support managerial decision making.

We are all expecting a shift in user demand toward newer system types but is it really there and, if so, what is the magnitude of the shift? Each user manager was asked to list the systems that he/she used regularly and then to classify them. Each user manager was also asked to list and classify systems requested but not yet installed (DP backlog) and systems desired but not yet requested (invisible additional backlog).

Figure 5 displays the results from 81 user managers. On the average these managers regularly used 3.4 systems each. Of the 277 installed systems listed, 90.3% are transaction processors while only 6.5% are flexible inquiry systems and merely 3.2% can be classfied as analysis type systems. This should be no surprise, but it serves as a baseline to interpret future trends.

Figure 5
Distributions of System Types

		monitor	exception	inquiry	analysis	total
installed	number	228	22	18	9	277
	% of total	82.3	8	6.5	3.2	
backlog	number	82	30	36	40	188
	% of total	43.6	16	19	21.4	
invisible	number	118	71	63	57	309
	% of total	38	23	20	18	
demand	number	200	101	99	97	497
	% of total	40	20	20	20	
ratio of percents		.5	2.5	3	6.5	1.8
growth rate		88%	460%	550%	1077%	179%
distribution change (percentage points)		↓42	↑12	↑13.5	↑16.8	

The known backlog, under which most DP shops are buried, is 188 systems or 68% of the currently installed base. The invisible backlog, however, is 309 systems or 169% of the known backlog; it is actually larger than the installed base! Total user demand (known plus invisible backlogs) is overwhelming -- 497 systems, 180% of the installed base. Certainly the invisible backlog number is less reliable than the known backlog and, hopefully, it is overstated. Nonetheless, fulfilling such a demand may well necessitate major changes in systems development and project prioritization procedures.

Not only is user demand overwhelmingly large but the distribution of system types is changing dramatically. Demand for analysis systems is up to 20%, over six times its current proportion. The combination of growth in overall demand and the shift in proportion yields a growth rate for analysis type systems of over 1000%. Comparatively, demand for monitoring systems is down to 40%, only one half its current proportion. This does not, however, imply that we can ignore monitoring systems; for the overall increase in demand is so large that the 40% proportion still numbers 200 systems or 88% of the 228 installed monitoring systems. What it does imply is a differentiated approach within DP to be able to successfully develop both monitoring and analysis systems.

Similarily, the demand for exception reporting systems is up from 8% to 20% and flexible inquiry system demand is up from 6.5% to 20%. Given the overall growth rate of 180%, this yields growth rates of 460% and 550% respectively, placing even greater demands on DP for a mix of different system types and the differentiated procedures for their successful creation.

A very encouraging fact, and for us surprising, is that the current known backlog is representative of the proportions in the invisible backlog and total demand. This implies that changes in DP policies and procedures to adapt to the known backlog will be viable in the longer term. Concomittantly, this increases the pressure on DP to adapt now, by obviating the argument for postponing change on the grounds of an unpredictable future.

Support for Important Tasks

In a separate set of questions we asked user managers to list their three most important tasks or decisions which could conceivably be supported by a computer system. We then asked what type of system they had to support each task and what type they would like to have. Figure 6 displays the result of these questions for 81 managers.

Figure 6
System Types for Important Tasks

	none	monitor	exception	inquiry	analysis	total
installed type	79	120	9	12	9	230
% of total	34%	52%	4%	5%	4%	
# installed of appropriate type	0	30	1	8	7	46
% of type approp	0	25%	14%	66%	78%	20%
of 120 monitor	0	30	14	41	33	120
% of total	0	25%	12%	38%	28%	

Of the 230 important tasks 79 or 34% were not supported by any type of system. 52% are supported in some way by monitoring systems whereas only 4% are supported by an analysis system.

The next two lines in Figure 6 indicate the number of each system type deemed appropriate for the task by its user manager. A system for a particular important task was judged to be of the appropriate type when the user manager's desired type of system was the same as the actual type. Of the 9 analysis systems 7, or 78%, were judged to be appropriate. In contrast, only 30, or 25%, of the monitoring

systems were judged appropriate and none of the 79 important tasks without support were judged to be unsupportable by computer systems. For managerially important tasks the satisfaction level varies by system type, with inquiry and analysis rated significantly higher.

The last two lines in Figure 6 provide a breakout of the 120 installed monitoring systems by desired type. No managers felt that computer support was completely inappropriate; rather they would prefer inquiry (38%) or analysis (28%) systems. Note that user managers are not just asking for the sky nor are they simply enamoured with technical fads, for 30 of the monitoring systems are judged to be quite appropriate for the task at hand.

Clearly, this is an undeniable source of user dissatisfaction. Most installed systems are judged by user managers to be of inappropriate type for their important supportable tasks. This is a more general problem than, or perhaps a major cause of, dissatisfaction with a system's design, development schedule/cost, or report contents. It is difficult, if not impossible, for the 33 of 120 monitoring systems which "should" have been analysis systems to be considered successful by users no matter how dedicated or competent the DP personnel.

Figure 7 compares the distribution of system types for all installed systems (277) and those listed as relevant to important tasks (150). Of the 277 systems cited by respondents, 127 were not even mentioned when respondents were subsequently asked to list systems which related to their most important tasks or decisions. Nine installed systems are classified as analysis type, all nine or 100% were cited in conjunction with important tasks. In contrast, of

the 228 monitoring systems installed only 120 or 53% even related to

Figure 7
"Important" Systems Subset

	monitoring	exception	inquiry	analysis	total
all systems	228	22	18	9	277
"important" systems	120	9	12	9	150
% of all systems	53%	41%	67%	100%	55%

managers most important tasks and, of those, only 30 (25%) are of appropriate type.

Figures 6 and 7 consider DP's product mix with respect to user needs and conclude that this is an undeniable source of user dissatisfaction. For user manager's important tasks: (1) 34% have no systems support of any kind (2), 46% of the installed systems do not relate to important tasks, and (3), of those systems which do relate to important tasks, only 31% are of the appropriate type. Although other factors contribute to user dissatisfaction, product mix alone is sufficient to justify user manager's feelings of DP's managerial irrelevance and lack of responsiveness to their needs.

Priorities & Performance

User and DP managers were asked to prioritize a list of 26 criteria for DP. Seperately, they were asked to evaluate the performance of DP on tnese same criteria. Success on each criterion can be calculated by weighting performance with priority. (Appendix 1, Question 15 contains the list of criteria.) The overall success is disappointingly, but realistically, low. On a scale from 1 to 7 where 5 is good and 3 is inadequate, the users rated DP a 4.306 and DP rated

itself only marginally higher at 4.489. Clearly both DP and users recognize that there is ample room for improvement.

Where, however, is DP doing comparatively well? The four most successful criteria, as rated by DP and users, are shown in Figure 8, each is at least one standard deviation above the overall average rating on all 26 criteria. There is amazingly excellent agreement between DP and Users on what DP does best -- the top three criteria are the same! Both Users and DP are "accurately" perceiving the situation -- DP is most successful in operational, technical areas. You will note, however, that even the highest ratings hover around 5 (good) and do not approach 6 or 7 (excellent) on the scale.

Figure 8
Most Successful Criteria

DP self-rating		rating	
F.*	quality of DP systems analysts	5.333	
H.	technical competence of DP staff	5.242	
W.	availability and timeliness of reports	5.273	
C.	hardware and systems downtime	5.091	
	overall average rating on 26 criteria	4.489	σ = .501

User rating of DP		rating	
H.	technical competence of DP staff	5.257	
F.	quality of DP systems analysts	4.986	
W.	availability and timeliness of reports	4.962	
	overall average rating on 26 criteria	4.306	σ = .439

* Letters used in Figure relate to items in Appendix 2.

Where is DP least successful? Figure 9 lists the worst four criteria on DP and user ratings. Users and DP agree that training programs for users in general DP capabilities (not system specific implementation

training) and developing more analysis type systems are inadequate (3 on the scale). DP adds criteria N and Z to the list (which users rate below the overall average) and Users add I and L (which DP rates below

Figure 9
Least Successful Criteria

DP self-rating	rating
D. training programs for users in DP capabilities	3.394
N. invol of senior user managers in DP policy & eval	3.710
M. developing more analysis type systems	3.750
Z. DP profitability from billbacks and billable time	3.750
overall average rating on 26 criteria	4.489

User rating of DP	rating
D. training programs for users in DP capabilities	3.434
I. the new systems request backlog	3.672
M. developing more analysis type systems	3.721
L. developing more inquiry type systems	3.785
overall average rating on 26 criteria	4.306

average). Here again there is reasonable agreement between DP and Users' perceptions of the situation. Apparently where DP does poorly, especially from the users perspective, is in developing inquiry and analysis type systems, getting through the backlog to be able to develop those systems, and general DP training to help users understand the capabilities of these systems. That the key is inquiry and analysis type systems can be seen by noting (1) the shift in demand to these types as previously discussed and (2) that in contrast, users give an average rating to monitoring systems development and slightly below average to exception systems development.

Simply stated, the user demand has shifted and DP has not

responded adequately. This impression is strongly reinforced by noting that DP's priorities on criteria D (5.139), I (4.603), L (5.038), and M (4.795) are all below DP's average priority rating (5.151) for all 26 criteria (See Appendix 2 for a complete list of priority ratings by DP and users.) DP has not shifted its internal priorities to respond to the shift in user demand.

Indeed, part of the explanation for low overall ratings may be simply that DP is performing well on comparatively unimportant criteria or that users priorities are unrealistic. User and DP top priority criteria (one standard deviation above the mean) are listed in Figure 10 along with values for priorities and performance.

Figure 10
User and DP Top Priorities

Users' top priorities	priority	performance
O. responsiveness to user needs	6.091	3.805
F. quality of DP systems analysts	6.030	4.643
A. communication with managerial users	5.879	3.962
G. attitudes of users to DP	5.879	3.797
H. technical competence of the DP staff	5.727	5.000
users' overall average on 26 criteria	5.075	4.036

DP's top priorities		
O. responsiveness to user needs	6.200	4.333
H. technical competence of the DP staff	5.949	5.121
W. availability and timeliness of reports	5.925	5.273
DP's overall average on 26 criteria	5.151	4.396

Users consider the technical competence of the DP staff, the quality of systems analysts, and their own attitudes toward DP to be important priorities for DP -- not unrealistic priorities. To this they add the

obvious priorities of user responsiveness and communication. DP agrees. User responsiveness is the top priority criteria for both users and DP yet both see performance as below average. Both rate technical competence as a top priority and agree that performance is significantly better than average. Again the message comes through that DP is doing relatively well technically but not in terms of user responsiveness, even given that DP rates this top priority and considers its own performance (4.333) to be about average (4.396). Recommendations for management which facilitated this situation would be welcomed by all.

We have explored areas of agreement between DP and users on priorities and performance. Where, however, are the areas of greatest disagreement? Figure 11 lists the priorities and performance differences greater than one standard deviation from the mean.

Figure 11
Greatest Disagreement between Users and DP

Priorities	Gap	DP hi/low
V. appropriate DP budget size or growth rate	.563	low
Q. increasing proportion of DP effort in new systems	.403	low
S. improving new systems development	.459	low
N. involvement of senior user managers in DP policy	-.449	high
G. attitudes of users to DP	.567	low
M. developing more analysis type systems	.478	low
average priority gap between Users & DP on 26 criteria	.236	
Performance		
I. new systems request backlog	.919	high
W. availability & timeliness of report delivery to users	.855	high
C. hardware and systems downtime	.788	high
L. developing more inquiry type systems	.733	high
T. user oriented analysts who know user operations	.736	high
average performance gap between Users & DP on 26 criteria	.270	

DP has significantly under-rated the priority, with respect to users, of criteria G,V,M,S, and Q, all of which are non-technical criteria. In contrast users have under-rated the priority of involvement of senior user managers in DP policy formulation and evaluation. User managers rated this criterion of below average importance. Clearly, if user managers want changes in DP priorities and shifts in the types of systems delivered they must shoulder the responsibility of involvement in DP policies. DP has recognized this need but is apparently being constrained by user reluctance and failure to recognize its importance.

The greatest disagreements on performance criteria are all due to DP over-rating itself. DP thinks it is doing a significantly better job of managing the backlog problem than do users. Similarly, on two technical/operational criteria, W and C, and on two additional managerial criteria, L and T, DP's rating is more optimistic than user's.

Company differences in DP Performance

These same 26 criteria can be analyzed by company to provide some initial summary insights into user satisfaction with central data processing and a gross cut at the reasons benind relative satisfaction or dissatisfaction.

One way in which to look at the data is to look for performance differences among companies. Figure 12 shows data for four of the companies. These four companies were selected because of the striking manner in which they illustrate the results.

The Figure lists four separate sets of data. The first of these, Section I, provides summary measures of user satisfaction. The two

measures shown are the users performance rating of the "overall cost effectiveness of DP" (item P in Appendix 2) and "in our company all DP should be centralized" (Appendix 1, Question 16, item F). Relatively high values on these questions provide votes of confidence in central DP. Low values are indications of less satisfaction.

It is clear from this initial set of data that companies D and A are given good marks by their users. (Note, company designations are purposely scrambled.) Company C is significantly behind these two, while the DP function in company B lags far behind in the users estimation.

Section II, separates out user performance ratings by traditional transaction processing systems (monitoring and exception). For transaction processors, the same order as above is apparent, except that company B is ranked about the same as company C.

The results in Section III, however, are striking and go far to explain the summary satisfaction results in Section I. Here it is apparent that the DP department in company B is very poorly rated in its performance in developing user-oriented inquiry and analysis type systems. Companies A and D fare relatively much better (although on an absolute scale their average performance is low). DP in company C, however, scores extremely well in the development of managerial systems, approaching "good" on analysis type systems.

Sections IV and V add to the image developed in Sections II and III of the relative performance of the DP departments of the four companies. Companies A and D are viewed as relatively strong in both the efficient use of DP resources and communicating with and assisting users to satisfy their needs. Company B does reasonably well with

regard to running existing systems, but fails badly in the area of user communication and assistance. The exact reverse is true in company C. It gets the highest marks on user assistance and the lowest on running existing systems.

Section IV deals with DP's ability to operate its internal operations efficiently and to meet report output schedules on a timely basis. This section presents three measures of DP performance in efficiently carrying out what are essentially transaction processing functions. Company D dominated, followed by A, B, and C. Interestingly, company B is rated well ahead of C on these functions and almost as high as A.

Section V deals with the ability of the DP organization to interact effectively with users. This includes five measures of DP personnel's ability to communicate with and aid user personnel. Here company C gets high marks. Companies A and D are rated reasonably well and company B lags well behind.

In summary the data reveal distinct differences from company to company. Levels of user acceptance vary and the reasons for acceptance, or lack of it vary - and are interesting.

There is little to choose between companies A and D. Both DP departments are relatively well accepted by users - but for slightly different reasons. Company D scores extremely well on traditional functions - both in developing monitor and exception systems and in running existing systems. It is in an approximate tie with company A for second place in the development of inquiry and analysis type systems and in assisting users and interacting with them. Company A's DP group lags a bit behind company D with regard to traditional

Figure 12

DP Performance by Company

	Firm A	Firm B	Firm C	Firm D
I. Overall Measures of User Satisfaction with DP				
B. overall cost effectiveness	5	3.3	4.3	4.6
- in our company all DP should be centralized	3.8	2.2	2.6	4.8
II. User Satisfaction with traditional Systems				
J. Development of monitor sys.	5.4	4.4	4.7	5.6
K. development of exception sys.	4.6	3.7	3.9	4.8
III User Satisfaction with Newer Systems				
L. Development of inquiry sys.	3.8	2.3	3.8	3.4
M. Development of analysis sys.	2.8	1.4	4.4	3.2
IV. User Satisfaction with the Running of Existing Systems				
U. Availability & Timeliness of Reports	4.6	4.4	3.9	5.7
T. Running Current Systems	4.6	4.4	3.7	5.7
P. Hardware Efficiency Utilization	5.3	5.0	3.7	5.5
V. User Satisfaction with DP Communication and Assistance				
D. Involvement, Senior User Managers	4.0	3.5	4.8	3.9
C. Responsiveness to User Needs	4.2	3.4	4.8	3.9
W. DP Support of Users in Proposal Preparation	3.6	3.3	4.4	3.8
Z. Communication with Managerial Users	4.4	3.9	4.7	4.8
X. User Oriented Systems Analysts	4.2	2.8	4.0	4.2

functions, but otherwise appears the same. Both companies, therefore, can be viewed as doing an "acceptable" job across all functions at this depth of investigation (N.B. we will probe deeper in the next report looking at many subsidiary questions.)

Company B is the lowest rated. Although it is almost even with A in running existing systems. It is rated lowest in developing all types of systems. Most especially, it is a disaster with regard to the development of inquiry and analysis type systems and in ongoing user assistance and support. This complete lack of user communication and aid in developing the types of systems that users feel they need earns it by far the lowest user acceptance.

Company C is interesting. On the cost effectiveness measure (Section I) it is not far behind company D. Yet, on the other measure in this area, users are strongly anti centralization! The data show that the DP department is perceived to do a rather poor job of performing existing functions (Section IV, Running existing systems), but a crackerjack job of interacting with users (Section V) and developing inquiry and analysis systems. Here the users have discriminated well. And they have reacted favorably to strong efforts to improve their use of computers. (In fact, this company has recently decentralized systems analysts to the user departments - and the result is clear!)

In summary, from the company data, it appears that users discriminate. They consider (1) progress in developing traditional systems, (2) progress in developing inquiry and analysis type systems, (3) the ability to run a good traditional shop, and (4) the ability to interact well with them to assist them in fulfilling their information

needs. If performance is relatively high along all lines, users are relatively pleased. The opposite is also true. Where performance is high in some areas, but perceived as low in others the DP department's score (cost-effectiveness) is in the middle.

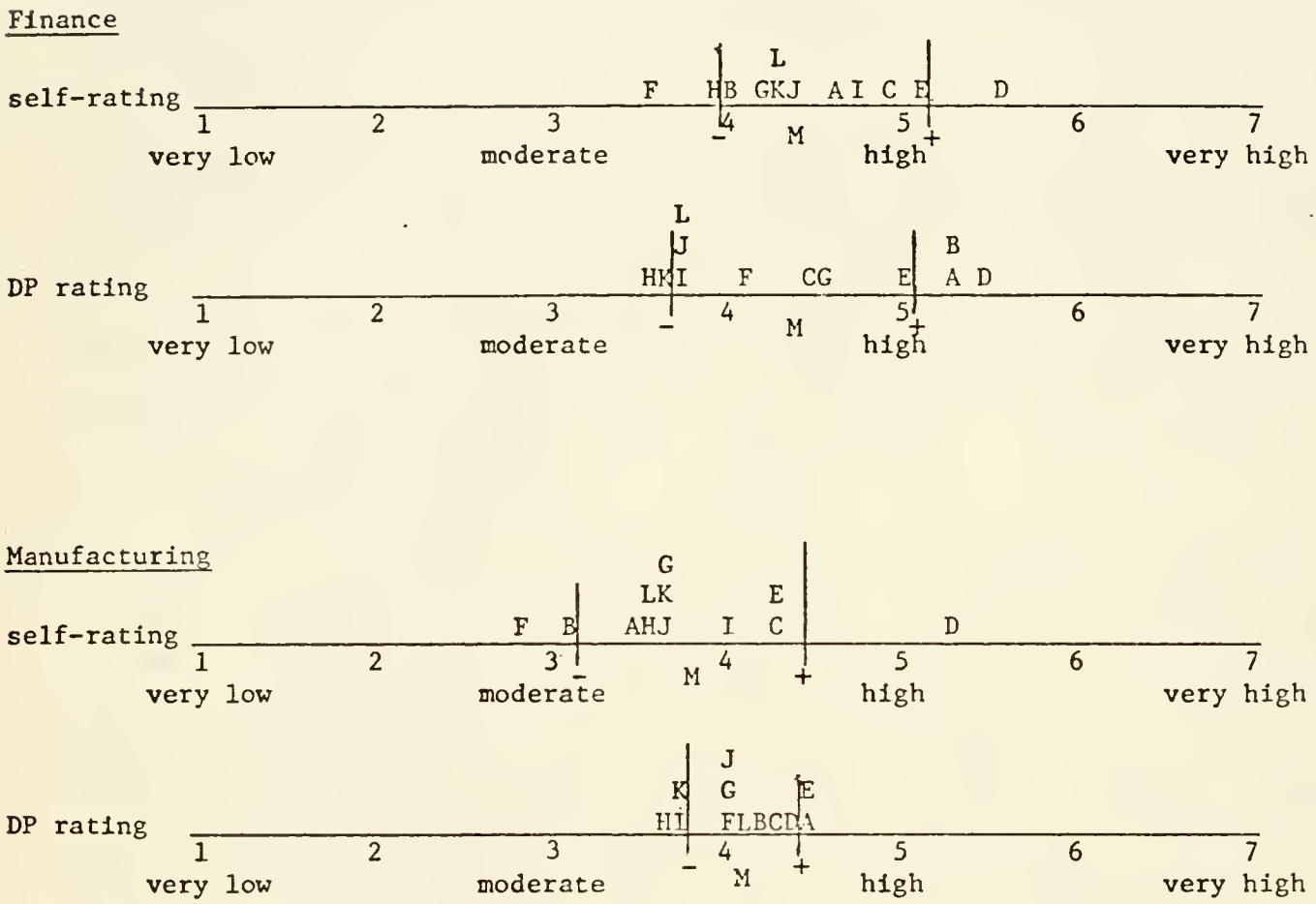
User Capability in DP

In another set of questions users and DP rated the user departments, Finance and Manufacturing, on their dependence on DP and capabilities of using DP. Figure 13 displays the results.

Users and DP agree that Finance is generally more capable and dependent on DP than Manufacturing. This makes sense given Finance's longer experience with DP and the almost total computerization of most accounting systems. Conversely, Manufacturing's shorter historical exposure to DP is also reflected in DP's limited ability to discriminate within Manufacturing as well as they do in Finance. The distribution of DP's ratings for Manufacturing in Figure 13 is significantly tighter than DP's ratings of Finance. Note, like the ratings for DP performance previously discussed, the averages are not impressive -- they hover between 4 (low) and 5 (high) and do not approach 7 (very high).

Areas of general agreement yield a profile of users. They are very willing to use DP's services (D) but rate significantly lower in terms of managerial use of systems (G). This contrast in use versus managerial use is reflected in significant differences of opinion on user reliance on DP (A). DP rates user reliance, especially Manufacturing, much higher than do users. Given the existing distribution of system types (90% transaction processors) this is understandable. DP sees mostly the transaction processing aspects of

Figure 13
Ratings of Users by Users and DP



A. reliance on DP for daily operations
B. workload placed on DP department
C. cooperation in developing new systems
D. willingness to use DP services
E. capability to use DP
F. number of new systems requested
G. use of DP systems by managers
H. technical competence in DP areas
I. ability to define your system needs clearly
J. patience in dealing with DP problems
K. project management skills for new systems development
L. sophistication of new systems requested

users where their reliance is heaviest. User managers (the respondents to this survey are all non-clerical) see mostly managerial activities which are unsupported (34%) or inappropriately supported (76%) by transaction processing systems.

Just as users rate their reliance (A) significantly lower than does DP, so too do they significantly underestimate the workload they place on DP (B). This is reinforced by users, especially Manufacturing, underestimating the load placed on DP by new systems requests (F). Although everyone agrees user patience with DP problems (J) is about average, it can never be improved until users have a more accurate perception of their workload transfered to DP. Many transaction processing systems have been installed so long ago, and deal only with details below the managerial level, that user managers have lost sight of the workload they have transfered (B) and, consequently, their reliance (A) on DP for daily operations.

Users and DP agree that user cooperation in developing new systems (C) is good, approaching high (5 on the scale), although the technical sophistication of new system requests (L) is not high. This is perhaps fortunate, for although users' capability to use DP systems (E) is high, their DP skills in system creation are low: technical competence (H), ability to clearly define needs (I), and project management (K). Of course, this may be a cause and effect loop; the technical sophistication of system requests may be constrained by low user system creation skills.

Users rate themselves higher on project management (K) and needs definition (I) than does DP -- users' self ratings are about average whereas DP rates them about one standard deviation below the mean.

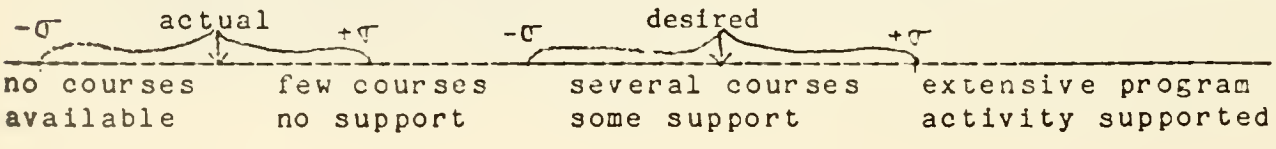
Some bias in this direction is expectable, but when Finance's self rating is significantly higher than DP's on ability to clearly define needs (I) there is real cause for concern.

Although DP's lower rating of users on technical competence (H) is due to a similar bias, there is greater agreement and less cause for concern. Users are not responsible for technical expertise (H) in computers like they are, or should be, for clear needs definition (I).

In summary, users are willing (D), cooperative (C) and capable (E) to <u>use</u> systems but their skills in creating systems -- technical (H), needs definition (I) and project management (K) -- are lacking. This is either a cause of, or a result of, limited <u>managerial</u> use (G) of technically non-sophisticated (L) systems.

To a certain extent users have recognized this problem and desire significantly more help from DP in two areas--training programs and proposal development. Users rated the availability, quality and subject breadth of general DP education courses for users and how active and supportive their DP department is in providing access to these courses. Figure 14 shows the actual training program and that desired by users. Clearly there is a need for user education in general DP capabilities and a desire for significantly more support in this area. DP management could improve its own life by helping users to learn more about DP--improving patience (J), defining needs (I), project management (K) and technical competence (H).

Figure 14
<u>General DP Training Programs: Actual and User Desired</u>



Proposal Development

Users have unfulfilled demands for inquiry and analysis type systems. Users also have relatively little experience with these system types, low technical and project management skills, and difficulty clearly defining their system needs. DP support for proposal development can be considered as a way out this trap if users desire such help.

Proposal development entails several tasks, each of which was rated by users for current and desired support. Figure 15 displays the results. Current support for proposal development on all dimensions is disappointingly low, the desired level is universally and significantly higher. Assessing technical feasibility (D) is most important and best supported currently. Recognizing potential applications (A) is important but has the largest gap between actual and desired support. Similarily, developing "hard" (B) and "soft" (C) cost/benefits are key areas of desired improvement.

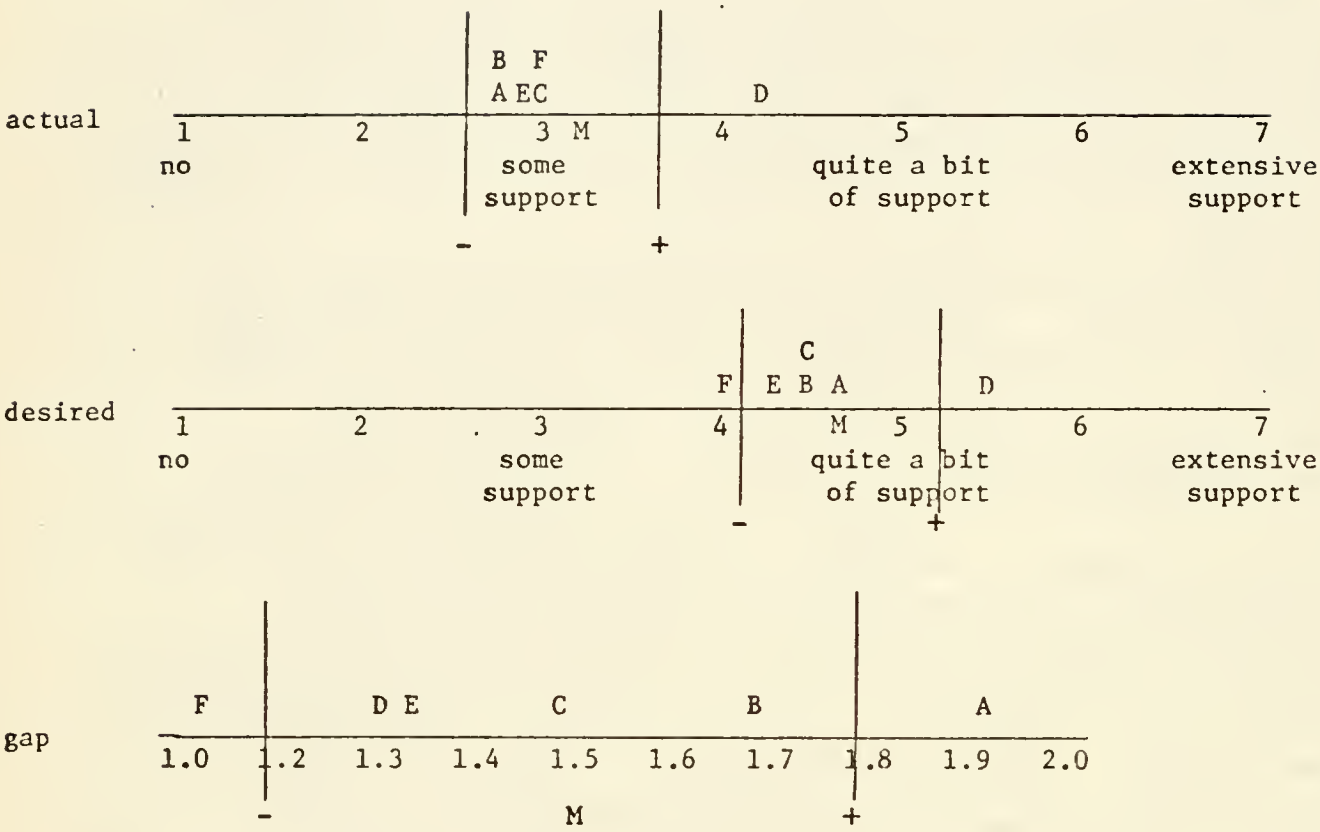
Users need proposal development support and recognize these needs. DP can benefit from providing this support and could link this to user training programs as a two pronged approach for increasing user capabilities in DP.

Macro Responses of Users to the Situation

What do users conclude from this depressing assessment of DP performances, mis-placed priorities, and unfulfilled demand for systems, training, and proposal support?

They could simply ignore data processing as a viable problem solving technique. Users were asked three questions to see if this

Figure 15
DP Support for Proposal Development



A. recognizing potential areas for DP systems
B. developing the cost/benefit estimates of a new DP system
C. developing qualitative benefits of a new DP system
D. assessing the technical feasibility of a new DP system
E. assessing the organizational impacts of a new DP system
F. working the politics of proposal or budget approval

was the case. See Figure 16 where the median response to each item by 81 managers is posted. The responses to items A,G and J are consistant and strong; users are not ignoring DP--they still believe that DP systems are worthwhile, relevant, and important.

If thats the case, then perhaps users desire to fulfill their needs by going to outside DP services. Item C implies that this might be the case but items I and L eliminate that explanation.

Well then, perhaps users want to decentralize DP, thinking they can do a better job, especially in user-oriented systems development. Clearly users do not want to decentralize hardware (D), nor are they pushing strongly for decentralization of systems development (E). However, users do not want DP completely centralized either (F). Perhaps they want some decentralization or influence over DP management issues like services provided (training, proposal support) or mix of system types (inquiry and analysis) or simply selective decentralization. Although probably they are just as confused over the right way to go on the centralization/decentralization issue as most DP managers.

Having eliminated several possible macro responses, what then is the user's response? Items H, B and K imply that users will continue to do the best they can with what they have. They will seek out DP's help in problem solving, rely on DP for systems development, and cooperate with systems implementation. Users are dissatisfied but are not writing-off their DP departments. Computer systems are worthwhile, relevant and important and users are willing to work with DP to improve the current situation.

Figure 16

User Responses to Macro Issues

For each of the following statements please indicate the extent of your agreement or disagreement. Use this scale and post the appropriate number next to each statement.

strongly disagree		disagree		agree		strongly agree
1	2	3	4	5	6	7

1.300 A. In gernal DP systems are a waste of money, time and effort.

2.115 B. I'd rather forego a necessary DP system than get out DP department involved.

4.680 C. Our DP department may not be perfect but they are better than any outside service bureau.

3.019 D. We would be better off if running existing systems and hardware was decentralized and under direct user control.

3.750 E. We would be bettere off if new systems development was decentralized and under direct user control.

3.111 F. In our company all DP should be centralized.

2.727 G. The things a DP system can do are not important compared to the real needs of my job.

4.750 H. I seek out opportunities to get DP involved in helping to solve our problems.

2.667 I. All DP systems for our department should be developed and implemented by outside consultants, service bureaus or software houses.

5.980 J. DP systems are an important tool for improving the performance of our department.

2.638 K. I'll cooperate if required with a DP system scheduled to be implemented in my department but I have more important things to do.

2.913 L. If we had a really important DP system to develop we'd better off to go outside.

Summary

The preliminary results from the User Needs Survey are encouraging in the sense that they are reliable and clearly reveal many interesting facts. The results are challenging in the sense that major DP and user improvements are necessary and further analysis of our data should yield some insights into problem causes and recommendations.

User satisfaction with DP performance is low and many areas of improvement are identified. Nonetheless, user demand for more systems and the shift in system mix is overwhelming.

Greater involvement of users in DP policy formulation is called for by DP along with improved skills in systems creation -- project management, needs specification and DP technologies. Certainly users must shoulder more of the responsibility for fulfilling their own needs.

Many problems between various functional departments in a firm go unresolved because of lack of agreement on priorities and problem definitions. However, this survey has revealed surprising agreement between users and DP on problem areas. Although there are certainly areas of disagreement between users and DP, with the agreement that does exist, you would expect serious efforts to resolve those problems. This does not appear to be the case. Apparently the reason for this lack of problem resolution is that neither users nor DP really understand what to do. What actions should be taken -- which policies and procedures should be changed and how? The number of interacting factors and our lack of understanding in how they interact

is preventing changes for problem resolution. The goal of this research effort is to develop a viable model of factor interaction, to break the log-jam of inactivity due to lack of understanding, and to make recommendations for managerial action in policies and procedures.

There is hope. This survey itself has demonstrated sophisticated user understanding and discrimination among diverse DP issues and serious attention to user needs by DP. Subsequent reports on the User Needs Survey will make managerial recommendations for responses to the problems and potentials identified.

In spite of the impediments, users consider computer systems worthwhile, relevant and important. Users are not only willing to use systems and cooperate in their development but recognize a need for more DP training and proposal development support.

APPENDIX 1

USER NEEDS SURVEY QUESTIONNAIRE

Section E

CENTER FOR INFORMATION SYSTEMS RESEARCH

Alfred P. Sloan School of Management
Massachusetts Institute of Technology

E53-316, 50 Memorial Drive, Cambridge, MA 02139

Number ____ ____ ____ ____

1. All of the job characteristics listed below have probably occurred at some point in time on your job. However, we are interested in the general nature of your job. Please post the number from this scale which best indicates how typical each characteristic is of your job.

not at all typical		somewhat typical		typical		completely dominant
1	2	3	4	5	6	7

___ A. many decisions, each of which involve a few, known, quantifiable factors where a best decision can be calculated

___ B. high uncertainty in defining a good decision or success in my job

___ C. well-defined responsibility boundaries which everyone knows

___ D. interdepartmental coordination where conflicting goals produce trade-offs

___ E. changes outside the firm require changes to decisions or procedures

___ F. assessment of the competition and long range planning is mandatory

___ G. each factor is known but there are so many that they are completely overwhelming

___ H. a few key decisions where "best" is not clear to anyone

2. What percent of the information you currently get from DP is not useful to you? _____%

3. When new DP systems are created there is frequently a project overrun. What do you think the average percent project budget and schedule overruns are in your organization?

average budget overrun _____% average schedule overrun _____%

4. Do you think that the current DP policy and procedures for the allocation of DP costs to users are equitable to your department? Post your response using this scale to the four categories of DP services listed. (If you don't know what the policy and procedures are, check here ___.)

outrageously unfair		unfair		reasonable		very equitable
1	2	3	4	5	6	7

A ___ proposal preparation

B ___ new system development

C ___ running existing systems

D ___ maintenance or enhancement of existing systems

5. Every manager has dozens of tasks and decisions for which he/she is responsible. However, there are usually just a few which are critical. Could you please briefly describe the top three which are or could be supported by some type of DP system.

1. _____

2. _____

3. _____

A. Please indicate for each of the top three you listed what type of DP system support you currently have by posting a number 1 to 4 (refer to the Definitions Page for DP system type) in the column below headed "current."

B. Please indicate for each of the top three what type of DP system support you would like to have by posting a number 1 to 4 (refer to the Definitions Page again) in the column below headed "desired."

C. Please think for just a moment about the value of the desired type of DP system support you indicated below. To the nearest thousand dollars, what would the monthly value of such a system be? Post in the column below headed "value." (Best guesses acceptable.)

critical tasks or decisions	A. current type	B. desired type	C. value
1.	_____	_____	$_____/month
2.	_____	_____	$_____/month
3.	_____	_____	$_____/month

6. Consider all the DP systems you don't have but would like to have (include systems in progress, requested not approved, and not yet requested).

A. Please indicate how many there are by type. Post the approximate number in the row labeled "how many" below each DP system type listed.

B. How important are these types of systems you don't have but would like to have? Post a number from this scale to the row below labeled "importance."

nice to have		important		necessary		critical
1	2	3	4	5	6	7

C. Have you submitted formal proposals to DP for new systems which are still pending? Please post the number of such proposals to the row below labeled "number of proposals."

	DP System Type (refer to the Definitions Page)			
	1	2	3	4
A. how many	____	____	____	____
B. importance	____	____	____	____
C. number of proposals	____	____	____	____

7. There is always a mixture of quantitative and qualitative benefits to a new DP system. Consider a proposal where quantitative costs and benefits breakeven but the qualitative benefits look very good. Please circle the number on the scale that most accurately describes what would happen to such a proposal in your organization.

1 We would never submit such a proposal because everyone knows it would be rejected.

2

3 It would be rejected on formal criteria but we could get it forced through if we had enough power and influence.

4

5 We would attempt to quantify the qualitative benefits, then it would be a struggle, but with DP's backing it would stand a reasonable chance.

6

7 After DP checked out the qualitative benefits to make sure they really were very good, the proposal would be easily approved.

8. Please list all business application systems with which you have direct or frequent contact in the left hand column below headed "system names" (for example, a payroll system).

A. In the next column below, headed "type," please post a number from 1 to 4 which best describes the basic type of each DP system. Refer the the Definitions Page for DP system type.

For each of the DP systems you listed below, we would like your opinion on:

B. Importance: the importance of the system to your department

C. Quality: the overall quality of the system

D. Development: the quality of the development process which created and implemented the system

Post the appropriate number for each from the following scale to the corresponding columns below:

very low — low — high — very high

1 2 3 4 5 6 7

	System Names	A Type	B Importance	C Quality	D Development
1.	_____	___	___	___	___
2.	_____	___	___	___	___
3.	_____	___	___	___	___
4.	_____	___	___	___	___
5.	_____	___	___	___	___

9. Your highest educational degree:

Year _____ Field _____

Degree: /_/ HS /_/ Bachelors /_/ Masters /_/ MBA /_/ Doctorate

10. Your current salary in thousands of dollars per year

/_/10-15 /_/16-20 /_/21-25 /_/26-30 /_/31-35 /_/36-40 /_/41 & up

11. We would like to know if you agree or disagree with the following statements:

strongly agree		agree		disagree		strongly disagree
1	2	3	4	5	6	7

A ____ We do not request as many new DP systems as we would like because of the overload in DP.

B ____ DP gives too much priority to supporting and maintaining old systems rather than developing new ones.

C ____ I am very frustrated by the low priority DP gives to developing new systems for our department.

D ____ The DP department is understaffed.

12. Please rate your own department on the following characteristics using this scale.

very low		moderate		high		very high
1	2	3	4	5	6	7

_____ A. reliance on DP for daily operations

_____ B. workload placed on DP department

_____ C. cooperation in developing new systems

_____ D. willingness to use DP services

_____ E. capability to use DP services

_____ F. number of new systems requested

_____ G. use of DP systems by managers

_____ H. technical competence in DP areas

_____ I. ability to define your system needs clearly

_____ J. patience in dealing with DP problems

_____ K. project management skills for new systems development

_____ L. sophistication of new systems requested

13. This question refers to the support provided by DP to users for new systems proposal development. Please use the following scale to indicate the degree of current availability of each aspect of pre-proposal support. Post in the column headed "current."

no support	some support	quite a bit of support	extensive support

1 2 3 4 5 6 7

desired	current	
____	____	A. recognizing potential areas for DP systems
____	____	B. developing the cost/benefit estimates of a new DP system
____	____	C. developing qualitative benefits of a new DP system
____	____	D. assessing the technical feasibility of a new DP system
____	____	E. assessing the organizational impacts of a new DP system
____	____	F. working the politics of proposal or budget approval

What level of pre-proposal support do you think the DP department should provide to users in your organization? Use the same scale above and post your responses in the column headed "desired."

14. We are interested in the availability, quality and subject breadth of general DP education courses for users and how active and supportive (arrangements and financial) your DP department is in providing access to these courses. Please indicate the current nature of the DP education program supported by your DP department, post your response, from the scale below, here _____. Now please indicate the type of DP education program for users you think DP should support, post your response, using the same scale, here _____.

no courses available	few courses, no support	several courses some support	extensive program, actively supported

1 2 3 4 5 6 7

15. Please rate the performance of your DP department on each factor listed below using this scale.

very poor	inadequate	good	excellent

1	2	3	4	5	6	7

A ____ sophistication of new systems
B ____ overall cost-effectiveness of DP
C ____ responsiveness to user needs
D ____ involvement of senior user managers in DP policy formulation and evaluation
E ____ the new system request backlog
F ____ technical competence of the DP staff
G ____ attitudes of users to DP
H ____ quality of DP systems analysts
I ____ data security and privacy
J ____ development of monitor systems (DP system type 1, see Definitions Page)
K ____ development of exception systems (DP system type 2)
L ____ development of inquiry systems (DP system type 3)
M ____ development of analysis systems (DP system type 4)
N ____ training programs for users in DP capabilities
O ____ hardware and systems downtime
P ____ efficiency of hardware utilization
Q ____ the proportion of DP effort expended in creating new systems
R ____ DP profitability from user billbacks and billable time ratios
S ____ report contents (relevance, currentness, flexibility, accuracy)
T ____ running current systems (costs, ease of use, maintenance)
U ____ availability and timeliness of report delivery to users
V ____ appropriate DP budget size or growth rate
W ____ DP support for users in preparing proposals for new systems
X ____ user oriented systems analysts who know user operations
Y ____ new system development (time, cost, quality, disruptions)
Z ____ communication with managerial users

16. For each of the following statements please indicate the extent of your agreement or disagreement. Use this scale and post the appropriate number next to each statement.

strongly disagree		disagree		agree		strongly agree
1	2	3	4	5	6	7

_____ A. In general DP systems are a waste of money, time and effort.

_____ B. I'd rather forego a necessary DP system than get our DP department involved.

_____ C. Our DP department may not be perfect but they are better than any outside service bureau.

_____ D. We would be better off if running existing systems and hardware was decentralized and under direct user control.

_____ E. We would be better off if new systems development was decentralized and under direct user control.

_____ F. In our company all DP should be centralized.

_____ G. The things a DP system can do are not important compared to the real needs of my job.

_____ H. I seek out opportunities to get DP involved in helping to solve our problems.

_____ I. All DP systems in our department should be developed and implemented by outside consultants, service bureaus or software houses.

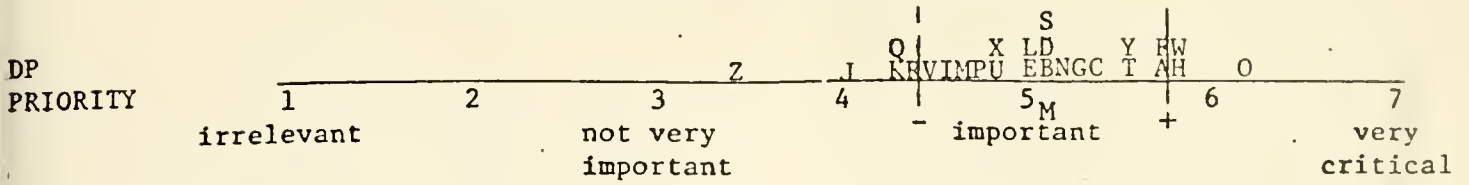
_____ J. DP systems are an important tool for improving the performance of our department.

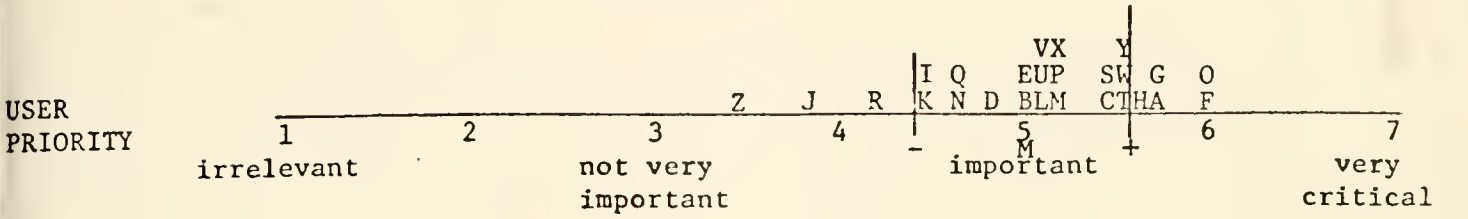
_____ K. I'll cooperate if required with a DP system scheduled to be implemented in my department but I have more important things to do.

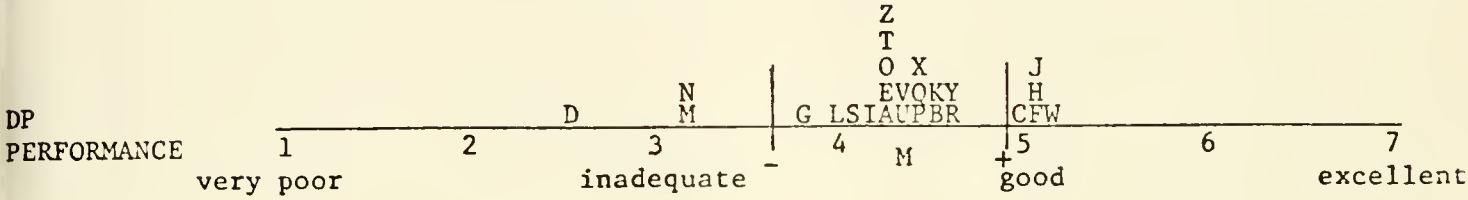
_____ L. If we had a really important DP system to develop we'd be better off to go outside.

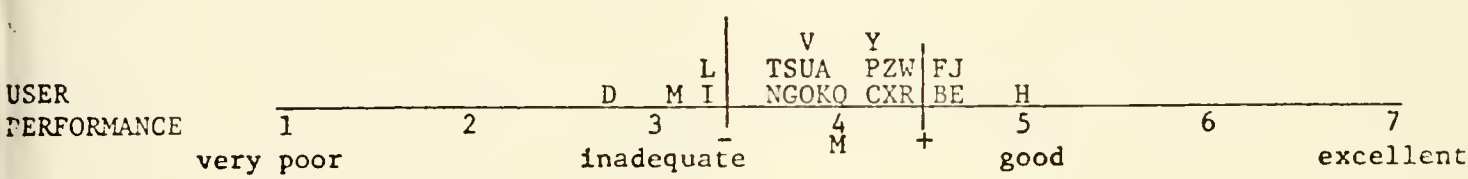
APPENDIX 2

PERFORMANCE AND PRIORITY CRITERIA









A. communication with managerial users
B. efficiency of hardware utilization
C. hardware and systems downtime
D. training programs for users in DP capabilities
E. data security and privacy
F. quality of DP systems analysts
G. attitudes of users to DP
H. technical competence of the DP staff
I. the new system request backlog
J. developing more monitor systems (DP system type 1, see Definitions Page)
K. developing more exception systems (DP system type 2)
L. developing more inquiry systems (DP system type 3)
M. developing more analysis systems (DP system type 4)
N. involvement of senior user managers in DP policy formulation and evaluatio
O. responsiveness to user needs
P. overall cost-effectiveness
Q. increasing the proportion of DP effort expended in creating new systems
R. sophistication of new systems
S. improving new system development (time, cost, quality, disruptions)
T. user oriented systems analysts who know user operations
U. DP support for users in preparing proposals for new systems
V. appropriate DP budget size or growth rate
W. availability and timeliness of report delivery to users
X. running current systems (costs, ease of use, maintenance)
Y. report contents (relevance, currentness, flexibility, accuracy)
Z. DP profitability from user billbacks and billable time ratios

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AUG 14 '87

ACME
BOOKBINDING CO., INC.
SEP 6 1983
100 CAMBRIDGE STREET
CHARLESTOWN, MASS.

HD28.M414 no.1088- 79
Keen, Peter G./Decision support system
737947 D*BKS 00136576
3 9080 002 042 890

MIT LIBRARIES
3 9080 004 524 408

HD28.M414 no.1090- 79
Bullen, Christ/Distributed processing
737951 D*BKS 00136577
3 9080 002 042 924

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